(IWM – 18) QT = DA Calculations for assessing IWM Requirements

Q is the flow to the border in cubic feet per second (cfs)
T is the inflow time (hours), i.e. the Irrigation Time set
D is the irrigation application depth (inches)
A is the area irrigated (acres)

Example: Alfalfa irrigated with a Hi-flow Turn Out

- **available flow per border is 7.5 cfs (Q)**
- **field took 2.0 hours (T) to irrigate**
- **2.5 inches (D) of irrigation water was applied per acre**

Continued: i.e., 2.0" was needed ÷ 2.5" applied = 0.80 (irrigation has an 80% application efficiency)

- **area irrigated was 6-acres (A);**
  (436 ft. x 600 ft.) ÷ 43,560 = 6.0 acres)

To solve for Q: Q = DA/T

Flow to Border	=	Application Depth (in.)	X	Area (acres)	÷	Inflow Time (hours)	=	
cfs	=	2.5 inches	X	6.0 acres	÷	2.0 hours	=	7.5 cfs

To solve for T: T = DA/Q

Inflow Time	=	Application Depth (in.)	X	Area (acres)	÷	Flow to Border (Q)	=	
hrs.	=	2.5 inches	X	6.0 acres	÷	7.5 cfs	=	2.0 hrs.

To solve for D: D = QT/A

Application Depth	=	Flow to Border (Q)	X	Inflow Time (hours)	÷	Area (acres)	=	
inches	=	7.5 cfs	X	2.0 hours	÷	6.0 acres	=	2.5 inches

To solve for A: A = QT/D

Area	=	Flow to Border (Q)	X	Inflow Time (hours)	÷	Application Depth (in.)	=	
acres	=	7.5 cfs	X	2.0 hours	÷	2.5 inches	=	6.0 acres

NOTE: Refer to the Field Irrigation Evaluation Guide. This guide is used to assess the actual irrigation application efficiency (Ea), IWM skill & understanding, etc., in order to plan and implement irrigation system and Irrigation Water Management (IWM) improvements.

Irrigation Application Efficiency (Ea): is the ratio of the average depth of irrigation water infiltrated & stored in the root zone to the average depth of irrigation water applied.

USDA-NRCS Surface Irrigation System – Graded Border Program gave the following analysis for irrigated field evaluated:

Inputs:

- cfs = 7.5
- Net application depth = 2"
- Field Slope = 0.001ft/ft
- Soil Intake = 0.6
- Roughness Coefficient = 0.15
- Field width = 436 ft
- Field Length = 600 ft

Results:

- Application Efficiency = 81%
- Gross Application = 2.48"
- Inflow time = 2.0 hrs.
- Runoff = 0.11"
- Deep Percolation = 0.36"

Rudy Garcia 2008